

THE CLAIMS

- 1 1. (currently amended) A nozzle for an injection molding machine, comprising:
 - 2 a nozzle body having first and second passageways therethrough, a counter bore defining
 - 3 an inner wall and a ledge, a portion of said inner wall being threaded, and an annular groove in
 - 4 said counter bore ledge, said annular groove being in fluid communication with said nozzle body
 - 5 second passageway;
- 6 an inner nozzle having a first end and having an orifice at a second end, said inner nozzle
- 7 having a passageway therethrough in fluid communication with said nozzle body first
- 8 passageway; and
- 9 an outer nozzle removably and fixedly coupled to said nozzle body at a first end and
- 10 having an orifice at a second end, said outer nozzle having a passageway therethrough in fluid
- 11 communication with said nozzle body second passageway, said inner nozzle being positioned
- 12 within said outer nozzle passageway.
- 1 2. (canceled)
- 1 3. (currently amended) The nozzle of claim [[2]] 1, wherein said annular groove has a
- 2 hemispherical shape.

1 4. (currently amended) The nozzle of claim [[2]] 1, wherein said outer nozzle further
2 includes:

3 a wall having a threaded portion to matingly engage said nozzle body inner wall threaded
4 portion; and

5 an annular groove on an inner end of said outer nozzle wall positioned to matingly
6 engage said nozzle body annular groove to provide fluid communication between said nozzle
7 body second passageway and an inner surface of said outer nozzle wall.

1 5. (original) The nozzle of claim 4, wherein said outer nozzle annular groove has a
2 hemispherical shape.

1 6. (original) The nozzle of claim 4, wherein:

2 said outer nozzle further includes a ledge in said inner surface of said outer nozzle wall;
3 and

4 said inner nozzle further includes a wall having a ledge on an outer surface of said inner
5 nozzle wall, said inner nozzle ledge configured to matingly engage said outer nozzle ledge.

1 7. (original) The nozzle of claim 6, wherein said inner and outer nozzles are configured
2 such that when said inner nozzle ledge is matingly engaged with said outer nozzle ledge and said
3 outer wall threaded portion is matingly engaged with said nozzle body inner wall threaded
4 portion, said inner nozzle is retained such that said inner nozzle passageway is in fluid
5 communication with said nozzle body first passageway and said outer nozzle passageway is in
6 fluid communication with said nozzle body second passageway.

1 8. (original) The nozzle of claim 7, wherein said nozzle body, said inner nozzle, and said
2 outer nozzle are all substantially concentric.

1 9. (original) The nozzle of claim 1, wherein:
2 said inner nozzle orifice and said outer nozzle orifice are substantially concentric and
3 substantially coplanar; and
4 said outer nozzle orifice substantially surrounds said inner nozzle orifice.

1 10. (original) The nozzle of claim 9, wherein said inner nozzle orifice has a diameter of
2 approximately 0.020 inch to approximately 0.150 inch.

1 11. (original) The nozzle of claim 10, wherein said outer nozzle orifice has a diameter of
2 approximately 0.050 inch to approximately 0.250 inch.

1 12. (original) The nozzle of claim 1, wherein a ratio of a diameter of said outer nozzle to a
2 diameter of said inner nozzle is from approximately 1:1 to approximately 10:1.

1 13. (original) The nozzle of claim 12, wherein said ratio is less than approximately 5:1.

1 14. (original) The nozzle of claim 12, wherein said ratio is less than approximately 3:1.

1 15. (original) The nozzle of claim 1, wherein:
2 said inner nozzle orifice and said outer nozzle orifice are substantially concentric and not
3 substantially coplanar; and
4 said outer nozzle orifice substantially surrounds said inner nozzle orifice.

1 16. (original) The nozzle of claim 1, wherein:

2 said inner nozzle further includes a wall having an inner surface and an outer surface;

3 said inner surface defines said inner nozzle passageway; and

4 said outer surface has a plurality of radial grooves, said radial grooves being in fluid

5 communication with said nozzle body second passageway.

1 17. (currently amended) The A nozzle of claim 16 for an injection molding machine,

2 comprising:

3 a nozzle body having first and second passageways therethrough;

4 an inner nozzle having a first end and having an orifice at a second end, said inner nozzle

5 having a passageway therethrough in fluid communication with said nozzle body first

6 passageway; and

7 an outer nozzle removably and fixedly coupled to said nozzle body at a first end and

8 having an orifice at a second end, said outer nozzle having a passageway therethrough in fluid

9 communication with said nozzle body second passageway, said inner nozzle being positioned

10 within said outer nozzle passageway; wherein:

11 said inner nozzle further includes a wall having an inner surface and an outer surface;

12 said inner surface defines said inner nozzle passageway;

13 said outer surface has a plurality of radial grooves, said radial grooves being in fluid

14 communication with said nozzle body second passageway;

15 said radial grooves extend from said inner nozzle first end to an alignment diameter of

16 said inner nozzle;

17 said inner nozzle further includes an annular groove between said alignment diameter and

18 said inner nozzle orifice; and

19 said inner nozzle further includes a plurality of outer passageways providing fluid

20 communication between said radial grooves and said inner nozzle annular groove.

1 18. (original) The nozzle of claim 17, wherein:

2 said inner nozzle further includes a tapered section between said inner nozzle annular

3 groove and said inner nozzle second end; and

4 an end of said tapered section and said outer nozzle defines said outer nozzle orifice, said

5 outer nozzle orifice being annular.

1 19. (original) The nozzle of claim 18, wherein said inner nozzle further includes a section

2 having a substantially uniform diameter between said inner nozzle annular groove and said

3 tapered section.

1 20-26. (canceled)